



## DECLARATION

I, Ginny Kang, a Korean citizen of #906, Sung-bo Apartment, Yeoksam-dong, Gangnam-gu, Seoul, Korea do hereby solemnly and sincerely declare as follows:

1. That I am well acquainted with the English and Korean languages.
2. That the following is a correct translation into English of Korean Patent Application No. 2002-86838 filed on December 30, 2002, and I make the solemn declaration conscientiously believing the same to be true.

Seoul, June 1, 2006

Ginny Kang

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5 [TITLE OF THE INVENTION-KOREAN] 레버를 이용한 동력 클러치

[TITLE OF THE INVENTION-ENGLISH] Power clutch that use lever

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[PURPOSE] I, hereby, submit the present application for the Patent under the Article 42 of the Patent Law, and request examination under the Article 60 of Patent

Law.

Attorney Hong-sik JEONG (seal)

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**[ABSTRACT]**

**[Abstract of the disclosure]**

A power clutch using a lever, and selectively transmitting a power of a power source in a plurality of directions, the power clutch comprising: a main clutch gear rotatably engaged with the driving source, and movably disposed on a main shaft; a first and a second gears rotatably connected with the main shaft, to selectively receive power of the main clutch gear; a clutch spring elastically biasing the main clutch gear to connect to the first gear; and a force control/connecting unit causing the main clutch gear to overcome the returning force of the clutch spring, forcibly separating the main clutch gear from the first gear and connecting it to the second gear. Because one common driving source can be connected to a plurality of driving systems, the driving system can be made compact, direction and mode of the operation can be controlled with a simple clutch operation, and manufacturing price can be reduced.

**[The main figure]**

FIG. 2

**[Search terms]**

Office automation device, power clutch, lever, clutch means

## **[SPECIFICATION]**

### **[The title of the invention]**

Power clutch that uses lever

### **[The brief description of the drawings]**

5           FIG. 1 is a perspective view of a gear train including a plurality of driving sources, as an example of a general power transmitting apparatus;

          FIG. 2 is a perspective view showing a power clutch using a lever according to the present invention being mounted to a gear train;

          FIG. 3 is an exploded perspective view viewed from a right side, showing the main  
10       part of FIG. 2, showing a power clutch using a lever according to the present invention;

          FIG. 4 is an exploded perspective view of the power clutch of FIG. 3 viewed from a left side;

          FIG. 5 is a front view showing the power transmitting status, with the turnable lever being released state;

15       FIG. 6 is a front view showing the power transmitting status, with the turnable lever being pushed state; and

          FIG. 7 is a plan view of FIG. 6

#### **<Description of the reference numerals in the drawing>**

10: driving motor	20: main clutch gear
20    30: first gear	40: second gear
21,22,31,41: latch gear part	50: clutch spring
60: force control/connect unit	61: turnable lever
61a: lever body	61b: power switching part
62: pressing means	70: main shaft

### **[Detailed description of the invention]**

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**[Object of the invention]**

**[The field of the invention and the prior art]**

The present invention relates to a clutch which transmits and controls power as it is generated in a driving power source, and more particularly, relates to a power clutch using a lever.

A power from a power source is generally transmitted in a regular direction to the units that require the power. The way of transmitting the generated power is to operate in a forward and reversal direction using a gear train, or to control the power using a certain clutch.

FIG. 1 shows a power transmitting apparatus of a general office automation device such as a multi-function unit or an inkjet printer.

As shown, the power from the first motor 2 mounted on the first frame 1 is sequentially transmitted to the nearby gears 4 via the first motor gear 3, and finally transmitted to the feeding unit 4a mounted on the first frame 1 to pickup loaded paper and convey the paper to a predetermined printing zone. The power from the second motor 6 mounted on the second frame 5 is sequentially transmitted to the nearby gears 8 via the second motor gear 7, and finally transmitted to the scanning unit 8a formed on the second frame 5 to perform a predetermined scanning operation. Accordingly, a plurality of power sources are implemented to transmit power to a plurality of gear trains on different frames, and thus, there are a plurality of power transmitting devices independently formed on the respective frames.

Because the power sources are independently formed on the respective frames, operations are limited to the rotation in forward and reverse directions, or power transmission and control. Of course, one power source can be used with an employment of idle gears to distribute the power. However, this way has the problem that the gear trains cannot be selectively driven. Accordingly, a power transmitting apparatus, which can selectively drive the respective gear trains, with requiring one common power source, is necessary.

**[Technical object of the invention]**

The present invention has been made in consideration of the above, and accordingly, it is an object of the present invention to provide a power clutch using a lever, which has a clutch member to one driving source, and can transmit power to a plurality of driving systems

for operations in various directions and modes.

**[Construction and operation of the invention]**

The above aspects and/or other features of the present invention can substantially be achieved by providing a power clutch selectively transmitting a power of a power source in a plurality of directions, the power clutch comprising: a main clutch gear rotatably engaged with the driving source, and movably disposed on a main shaft; a first and a second gears rotatably connected with the main shaft, to selectively receive power of the main clutch gear; a clutch spring elastically biasing the main clutch gear to connect to the first gear; and a force control/connecting unit causing the main clutch gear to overcome the returning force of the clutch spring, forcibly separating the main clutch gear from the first gear and connecting it to the second gear.

According to the preferred embodiment of the present invention, the force control/connecting unit comprises: a turnable lever turnably formed on a frame on which the main shaft is supported, with one end being interposed between the main clutch gear and the first gear; a pressing means forcibly rotating the turnable lever to cause one end of the turnable lever to push the main clutch gear toward the second gear and separate from the first gear.

The turnable lever comprises: a lever body rotatably supported by the frame; a power transmitting part bent and extended on one end of the lever body, the power transmitting part having an opening through which the shaft is inserted to be interposed between the first gear and the clutch gear.

There are latch gear parts on both sides of a body of the main clutch gear, and there are latch gear parts corresponding to the latch gear parts of the main clutch gear, on the first and the second gears, respectively.

The latch gear parts of the main clutch gear and the first gear are teeth-engaged with each other, by passing through an opening formed in one end of the turnable lever.

The power switching part has a thickness which is smaller than the gap between facing sides of the main clutch gear and the first gear.

The preferred embodiments of the present invention will now be explained in greater detail with reference to the accompanying drawings.

FIG. 2 is a perspective view showing a power clutch using a lever according to the present invention, being mounted to a power transmitting apparatus of an office automation

device such as a multi-function unit or an inkjet printer. FIG. 3 shows the power clutch of FIG. 2 in exploded perspective view.

Referring to FIGS. 2, 3 and 4, the power clutch according to the embodiment of the present invention controls and transmits the power to selectively drive a feeding unit 12 and a scanning unit 13, using a single common driving source formed on a frame 100, that is, using a driving motor 10. The feeding unit 12 and the scanning unit 13 are general ones as employed in the multi-function device operating as an inkjet printer and a photocopier, and detailed explanation thereof will be omitted.

The power clutch according to the embodiment of the present invention includes a main clutch gear 20 which is rotatably and slidably formed on the main shaft 70 disposed on the frame 100, first and second gears 30, 40 coaxially formed with each other, with having the main clutch gear 20 therebetween, a clutch spring 50 and a force control/connecting unit 60.

The main clutch gear 20 is engaged with a motor gear 11 of the driving motor 10. Latch gear parts 21, 22 are formed on both sides of the body of the main clutch gear 20. By moving on the main shaft 70 in left or right direction, the main clutch gear 20 is selectively connected with the first or the second gear 30 or 40 and thus selectively transmits power.

The first and the second gears 30, 40 are at a predetermined distance away from the main shaft 70 and rotatable. Preferably, the first and the second gears 30, 40 are fixed on their axes during rotating so that they can efficiently transmit power. The first gear 30 is connected with the feeding unit 12 to transmit power, and the second gear 40 is connected with the scanning unit 13 to transmit power. Each of the first and the second gears 30, 40 are provided with latch gear parts 31, 41 which correspond to the latch gear parts 21, 22 of the main clutch gear 20.

The clutch spring 50 is disposed between the main clutch gear 20 and the second gear



40 to elastically bias the main clutch gear 20 toward the first gear 30. In normal state, the main clutch gear 20 is in connection with the first gear 30.

The force control/connecting unit 60 forcibly separates the main clutch gear 20 from the first gear 30 and connects it to the second gear 40. The force control/connecting unit 60 includes a turnable lever 61 which is turnable on a hinge member 90 with respect to the frame 100, a torsion spring 63 urging one end of the turnable lever 61 toward the first gear 30, and a pressing means 62 (FIG. 7) forcibly turning the turnable lever 61 in the direction opposite the pressing direction of the torsion spring 63.

The turnable lever 61 includes a lever body 61a turnable with respect to the frame, and a power transmitting part 61b bent and extended from one end of the lever body 61a and disposed between the first gear 30 and the main clutch gear 20. The power transmitting part 61b has an opening H through which the main shaft 70 is inserted. The opening H is sized to be large enough for the latch gear part 21 of the main clutch gear 20 and the latch gear part 31 of the first gear 30 to pass therethrough without interference. Accordingly, the latch gear part 21 of the main clutch gear 20 and the latch gear part 31 of the first gear 30 are engaged with each other by passing through the opening H. The power transmitting part 61b is sized to have a thickness smaller than the gap between the facing sides of the main clutch gear 20 and the first gear 30.

The pressing means 62 may include a hand of a user or a predetermined mechanic system, but the embodiment of the present invention employs, as shown in FIG. 7, a carriage having an ink cartridge linearly moving in a shaft direction in the same direction as the shaft 70. For example, when the multi-function unit turns from the print mode to the scanning mode, the carriage is separated from the print zone, and moved to press the turnable lever 61, interfering with the other end of the turnable lever 61 and turning it in the direction A. Accordingly, power of the driving motor 10 is controlled at the feeding unit 12, and

transmitted to the scanning unit 13.

The operation of the power clutch in an office automation device according to the embodiment of the present invention will be explained with reference to FIGS. 5 to 7.

FIG. 5 schematically shows the force control/connecting unit 60 of FIG. 2 not  
5 operating. In this case, the power from the driving motor 10 is transmitted to the main clutch gear 20 via the motor gear 11. Because the latch gear parts 21, 31 of the main clutch gear 20 and the first gear 30 are teeth-engaged with each other, with being elastically biased by the clutch spring 50, they are rotated. Accordingly, power is not transmitted to the second gear 40, but passed via the first gear 30 and transmitted to the feeding unit 12.

10 Meanwhile, as shown in FIGS. 6 and 7, when the carriage including the ink cartridge, which operates as a pressing means 62 to the turnable lever 61 of the force control/connecting unit 60, approaches and presses the lever body 61a, the turnable lever 61 is turned in the direction A. Accordingly, the turnable lever 61 overcomes the returning force of the clutch spring 50 to separate the main clutch gear 20 from the first gear 30 and move it toward the  
15 second gear 40. Although the carriage is used as one example of the pressing means 62 of the force control/connecting unit 60, it should not be construed as limiting. A hand of a user or any other appropriate means can be used as the pressing means 62. As a result, power of the driving motor 10 is transmitted to the second gear 40 via the main clutch gear 20 as shown in FIGS. 6 and 7, and thus, transmitted to the unit in engagement with the second gear 40, such  
20 as the scanning unit 13 of the office automation device, for example.

When the pushing force on the force control/connecting unit 60 is not exerted any more, that is, when the carriage is returned to a predetermined printing position, the main clutch gear 20 is returned to the initial condition as shown in FIG. 6. Accordingly, the power of the driving motor 10 is transmitted to the first gear 30 by the processes as explained  
25 above, to operate the feeding unit.

### **[Effect of the invention]**

With a power clutch using a lever according to the present invention as explained above, one common driving source can be connected to a plurality of driving systems. Accordingly, the driving system can be made compact, direction and mode of the operation can be controlled with a simple clutch operation, and manufacturing price can be reduced.

Although the preferred embodiment of the present invention has been described, it will be understood by those skilled in the art that the present invention should not be limited to the described preferred embodiment, but various exchanges and modifications can be made within the spirit and the scope of the present invention. Accordingly, the scope of the present invention is not limited within the described range but the following claims.

### **Claims**

1. A power clutch selectively transmitting a power of a power source in a plurality of directions, the power clutch comprising:

a main clutch gear rotatably engaged with the driving source, and movably disposed on a main shaft;

a first and a second gears rotatably connected with the main shaft, to selectively receive power of the main clutch gear;

a clutch spring elastically biasing the main clutch gear to connect to the first gear;

and

a force control/connecting unit causing the main clutch gear to overcome the returning force of the clutch spring, forcibly separating the main clutch gear from the first gear and connecting it to the second gear.

2. The power clutch of claim 1, wherein the force control/connecting unit comprises:

a turnable lever turnably formed on a frame on which the main shaft is supported, with one end being interposed between the main clutch gear and the first gear;

a pressing means forcibly rotating the turnable lever to cause one end of the turnable lever to push the main clutch gear toward the second gear and separate from the first gear.

3. The power clutch of claim 2, wherein the turnable lever comprises:

a lever body rotatably supported by the frame;

a power transmitting part bent and extended on one end of the lever body, the power transmitting part having an opening through which the shaft is inserted to be interposed between the first gear and the clutch gear.

5           4.       The power clutch of one of claims 1 through 3, wherein there are latch gear parts on both sides of a body of the main clutch gear, and there are latch gear parts corresponding to the latch gear parts of the main clutch gear, on the first and the second gears, respectively.

10           5.       The power clutch of claim 4, wherein the latch gear parts of the main clutch gear and the first gear are teeth-engaged with each other, by passing through an opening formed in one end of the turnable lever.

15           6.       The power clutch of claim 1, wherein the power switching part has a thickness which is smaller than the gap between facing sides of the main clutch gear and the first gear.